

REMARKS

Claims 1-7 and 9 are pending in this application. Claim 8 has been canceled. Claim 1 has been amended. No new matter has been introduced.

Claims 1-7 and 9 are rejected under 35 U.S.C. §103 as being unpatentable over Kaufman (U.S. Patent No. 2,623,893) ("Kaufman") in view of Sie et al. (U.S. Patent No. 5,216,034) ("Sie") or Konig et al. (U.S. Patent No. 5,631,302) ("Konig"), and further in view of Woodhouse et al. (U.S. Patent No. 2,205,184) ("Woodhouse"). This rejection is respectfully traversed.

The claimed invention relates to a process for production of pure methanol from methanol synthesis gas, wherein ketone and aldehyde by-products are (in a second step) hydrogenated by contact with a copper, zinc, alumina methanol conversion catalyst to alcohols in presence of methanol synthesis gas (with methanol having been formed in a previous methanol conversion step) (see ¶[0047]-¶[0049] of the published application). In the hydrogenation step, the ketone and aldehyde by-products having a boiling point close to that of methanol are converted to their corresponding alcohols with a higher boiling point. Thus, a subsequent purification of the raw methanol by means of distillation is much simpler compared to distillation of methanol containing aldehydes and ketones.

To emphasize the above-mentioned features, claim 1 has been amended to recite a copper, zinc, aluminum catalyst being active in the hydrogenation of ketones and aldehydes in presence of methanol, and also to recite a further step (f) for the purification of the liquid crude methanol by distilling of the alcohols being formed in step (c).

In view of the above remarks and amendments, the subject matter of claims 1-7 and 9 would not have been obvious over Kaufman in view of Sie, Konig and Woodhouse, considered alone or in combination.

Kaufman relates to hydrogenation of oxygenated organic compounds. In Kaufman, the hydrogenation is carried out in the presence of iron, nickel, cobalt or copper oxide-chromium

catalysts (col. 3, lines 33-36). In Kaufman, hydrogen for use in the hydrogenation reaction stems from a carbon monoxide and hydrogen containing tail-gas. Prior to the hydrogenation reaction, carbon monoxide is eliminated from the gas by conversion to methane and carbon dioxide (col. 3, lines 60-65). The product from the process of Kaufman is a mixture of alcohols and other oxygenated organic compounds (col. 8, lines 29-33 and the Figure).

Sie relates to a process for the production of methanol in more than one reactor connected in series and with interstage removal of methanol from the reaction mixture (col. 2, lines 23-28 and the Figure). Sie is completely silent about hydrogenation of aldehydes and ketones contained in methanol being formed in a previous step. Even if ketones and aldehydes would be present in the reaction mixture, these products would be removed together with methanol effluent during interstage cooling, and hydrogenation will evidently not occur in subsequent reactors. Even if Sie mentions copper-zinc alumina catalysts, these catalysts are used solely in the methanol synthesis.

Similar to Sie, König describes a two stage methanol process with interstage removal of methanol being produced in a first reactor and a second reactor (col. 3, lines 50-61). Consequently, no ketone or aldehyde hydrogenation could occur in König.

Woodhouse relates to the purification of aldehyde-ketone mixtures by removing selectively aldehydes from the mixture in an aldehyde hydrogenation step (col. 1, lines 30-36). Specific catalysts for the hydrogenation are chromates, tungstates and vanadates, nickel catalysts and copper alloys containing nickel, cobalt, silicon or magnesium (col. 2, lines 1-10).

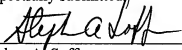
In addition to being directed to selective hydrogenation of aldehydes, Woodhouse fails to specifically mention hydrogenation by means of methanol synthesis gas and in the presence of methanol having been formed in a previous step. In a first example, an aldehyde-ketone mixture is hydrogenated with hydrogen (col. 2, lines 20-25) and, in a second example, an aldehyde-ketone mixture is prepared by oxidizing alcohols and hydrogenating the formed mixture (col. 2, lines 32-40).

In summary, none of the cited references, Kaufman, Sie, Konig and Woodhouse, discloses or suggests the various limitations of amended independent claim 1. A combination of Kaufman with Sie and/or Konig would provide -- at most -- that methanol can be prepared by contact with a copper-zinc alumina catalyst but would be silent about the use of that catalyst for hydrogenation of aldehydes and ketones in a methanol synthesis gas and in presence of methanol. The same argument holds against a combination of Kaufman and Woodhouse.

Allowance of all pending claims is solicited.

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